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CROP PRICE PREDICTION USING MACHINE LEARNING

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ABSTRACT

Every country in the world relies heavily on agriculture. Several unresolved issues in agriculture, such as yield recommendations and crop price forecasting based on market value, could enhance farmers' livelihoods and increase yields. Modern technologies today have shown the capability to develop automated advanced applications for various purposes. The study utilizes machine learning models, specifically decision tree algorithm, to improve crop productivity and pricing estimates. It offers a detailed analysis of machine learning techniques/algorithms applied in the agricultural sector. The results of the system were presented to showcase its efficiency. Additionally, a future plan includes designing an automated price recommendation system using genetic algorithms.

Keywords: Farming, Crop Yield, Price Recommendation, Machine Learning, Decision Tree Algorithm.

I. INTRODUCTION

Agriculture is vital for India, feeding its vast population and occupying over 60% of the land. However, predicting crop yields is complex due to diverse factors like terrain, soil quality, pests, genetics, water availability, and weather.

Traditionally, farmers relied on experience and historical data for decisions, but modern technologies like machine learning (ML) offer more precise predictions. ML models analyze vast data sets efficiently, surpassing traditional statistics in accuracy.

Recent studies highlight ML's potential in agriculture, focusing on techniques like remote sensing for yield prediction and disease detection in crops like palm oil. However, these studies often lack specific ML algorithms. To bridge this gap, a comprehensive review is needed to recommend high-yield crops and pricing strategies based on various parameters, benefiting farmers economically.

In summary, agriculture in India faces challenges due to population growth, climate variability, and soil degradation. ML offers promise in predicting crop yields accurately, aiding in informed agricultural decisions for sustainable food production and economic stability.

II. LITERATURE SURVEY

Agriculture, fundamental to all economies, faces challenges like climate change and fluctuating crop prices. Data mining and machine learning (ML) offer innovative solutions to predict and enhance crop productivity and market prices. Farmers historically relied on experience to forecast prices, but this approach lacked accuracy. ML techniques like XGBoost, Neural Networks, and Decision Trees are now employed to analyze vast datasets and predict crop prices effectively.

Choosing the right crop is critical for maximizing yield, influenced by environmental factors. However, many farmers lack access to expert advice due to cost and time constraints. Machine learning, a subset of artificial intelligence, allows computers to learn from data without explicit programming. It leverages big data, enabling sophisticated analysis and modeling. ML tackles supervised (predicting known outcomes), unsupervised (finding patterns in data), and reinforcement learning (maximizing rewards). Recent studies integrate ML with agriculture to forecast crop productivity amid climate disruptions. Deep learning techniques like Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) networks handle spatial and temporal data for accurate predictions.

ML algorithms such as Random Forests and Support Vector Regression are used to forecast yields, benefiting from advancements in big data technology. These techniques empower farmers with web-based tools for informed decision-making. ML models assess various factors like soil quality, weather, and maintenance to

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predict crop outcomes with high accuracy.

In conclusion, machine learning revolutionizes agricultural forecasting, offering scalable and precise solutions for predicting crop yields and market prices. The integration of advanced technologies with agricultural practices aims to ensure food security and sustainable farming amidst evolving climatic challenges.

III. PROBLEM STATEMENT

"To develop an approach and test it for accurate prediction of prices of various crops".

Prediction of expected price in the future is very much needed to manage and sell the products at the right time to maximize revenue and minimize loss. In past years, price prediction was done by judging the farmers experience on particular crop and field. Suppose that we have the previous data available in which various corresponding price predictions are recorded and these recorded price predictions are used to classify future price predictions.

The price forecasting is important for farmers also as they base their production and marketing decisions on the expected prices that may have financial repercussions many months later.

IV. SEQUENCE DIAGRAM

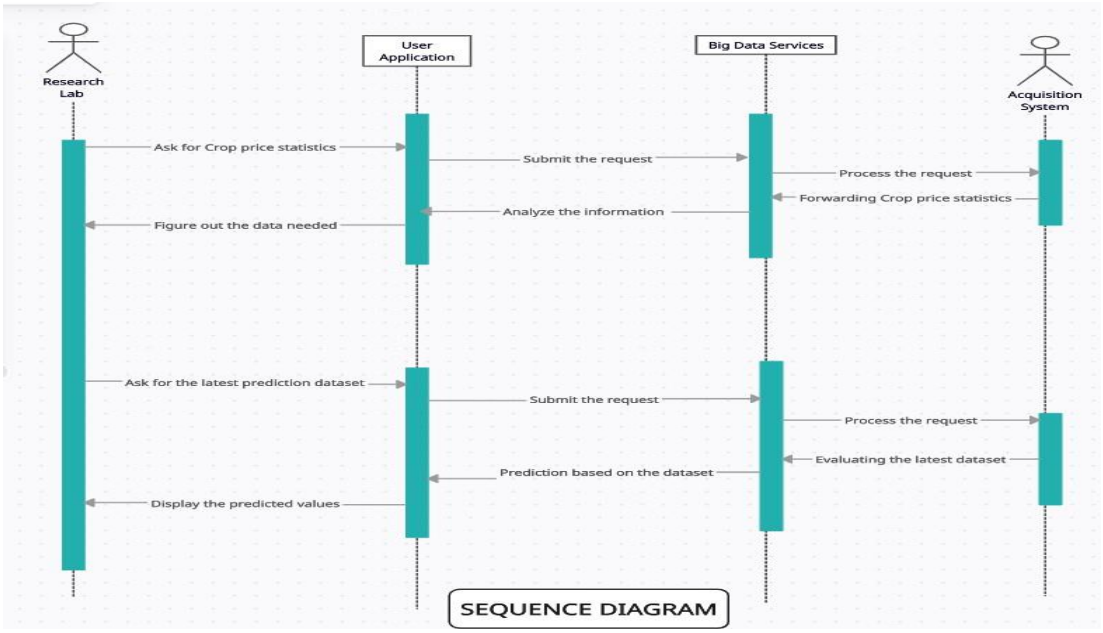

Figure 1: Sequence Diagram

V. SYSTEM ARCHITECTURE

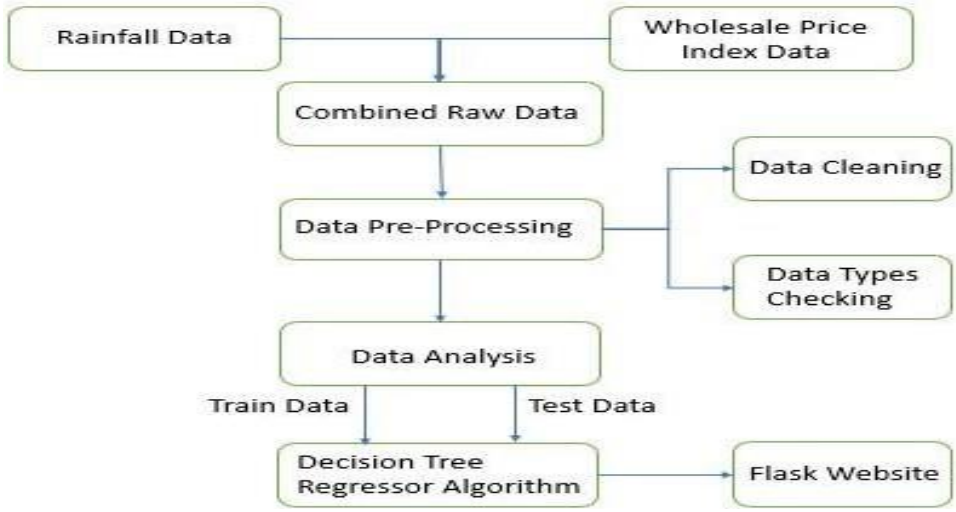

Figure 2: System Architecture

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It is a tree-structured classifier, where internal nodes represent the features of a

dataset, branches represent the decision rules and each leaf node represents the outcome. In a Decision tree, there are two nodes, which are the Decision Node and Leaf Node.

Decision nodes are used to make any decision and have multiple branches, whereas Leaf nodes are the output of those decisions and do not contain any further branches.

The decisions or the test are performed on the basis of features of the given dataset.

VI. IMPLEMENTATION

6.1 Data Collection: To collect historical crop prices and weather related data.

6.2 Data Pre-processing: To perform data pre-processing on the gathered data.

6.3 Data Exploration: To analyze the trend in data set.

6.4 Model Training: To build a predictive model using Decision Tree Algorithm.

6.5 Web Application: To devlop a unique web application to display the predicted price.

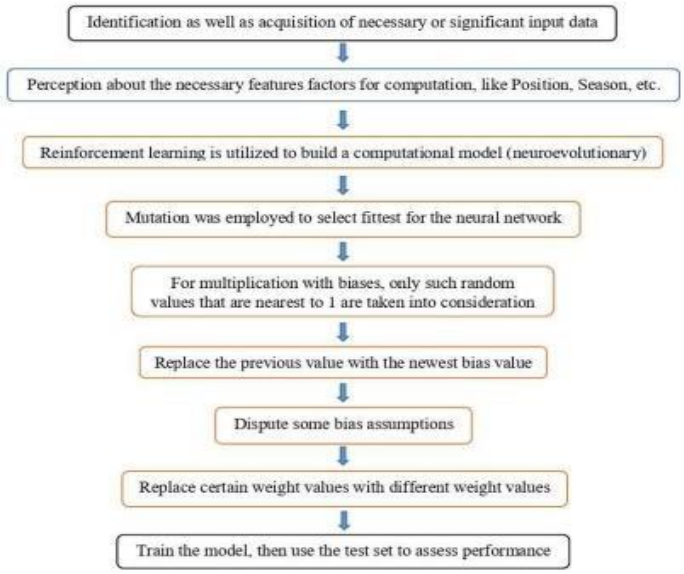

Figure 3:

VII. OVERVIEW OF CROP YIELD PREDICTION SYSTEM

- **Data Pre-processing:** When using the ML algorithm, three datasets that were acquired as raw data must be processed. The data that are gathered are frequently missing in specific behaviors or trends, inconsistent, and incomplete. They are also probably full of mistakes. In order to use them for the model, they are pre-processed into a format after being gathered, using pandas in python to visualize and analyze massive amounts of data, removing any unnecessary columns. Mean values are used to fill in empty columns.
- **Decision Tree Technique:** The Decision Tree technique is versatile, applicable for both classification and regression tasks in supervised learning. It serves two primary purposes: price prediction and profit prediction in agriculture. For price forecasting, factors like rainfall, Minimum Support Price (MSP), Maximum Trade, and production levels are considered. Profit projections involve factors such as crop prices, harvest yields, cultivation expenses, and grain charges.

To forecast crop prices, the Naive Bayes algorithm, a machine learning classification technique, is employed. For predicting crop profits, the K-Nearest Neighbor (KNN) algorithm, another supervised learning method, is utilized. Users can select specific crops and prediction methods, providing necessary model parameters.

Behind the scenes, optimization techniques refine the models to provide accurate predictions, delivering valuable insights to decision-makers who can then communicate this information to farmers. Ultimately, this system empowers farmers with forecasts that enhance profitability, consequently contributing to the overall national economy.

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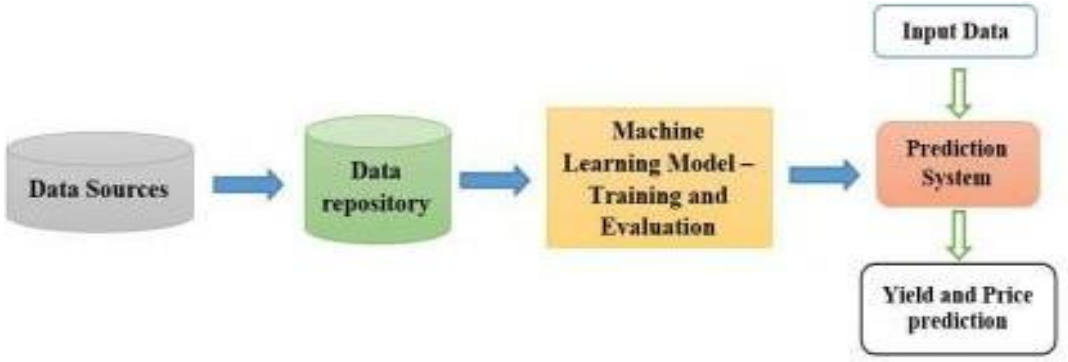
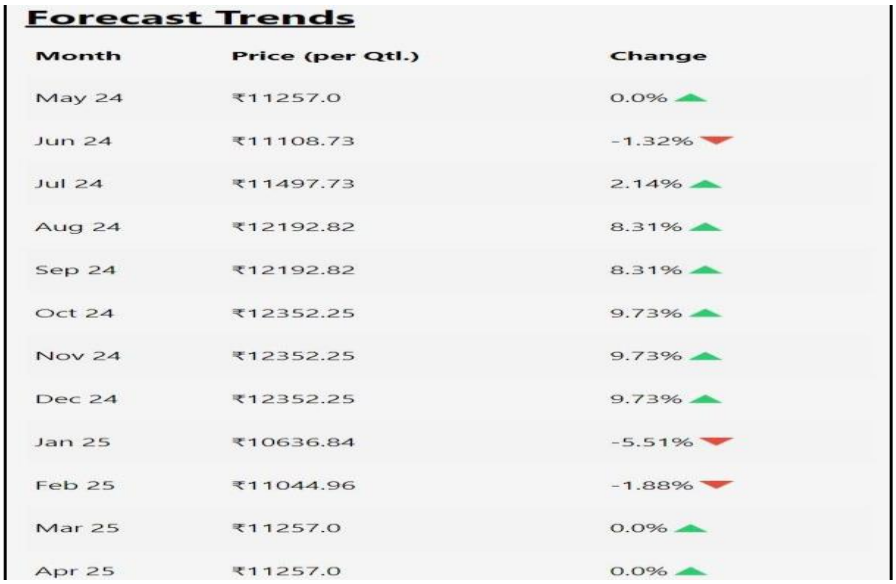


Figure 4:

VIII. RESULT

Based on the analysis, the better crop yield shall be arrived using random forest technique and also regression analysis is more important since regression analysis is a method of predictive technique that looks into the connection between a dependent (target) and an independence (s) factor (predictor). For instance, if the crop is a seasonal crop, its maturity will be classified as Early-mid maturing, Mid-maturing, or Default. The harvesting period may also be forecast, allowing farmers to obtain a higher yield and higher profit.



Forecast Trends

Month	Price (per Qtl.)	Change
May 24	₹11257.0	0.0%
Jun 24	₹11108.73	-1.32%
Jul 24	₹11497.73	2.14%
Aug 24	₹12192.82	8.31%
Sep 24	₹12192.82	8.31%
Oct 24	₹12352.25	9.73%
Nov 24	₹12352.25	9.73%
Dec 24	₹12352.25	9.73%
Jan 25	₹10636.84	-5.51%
Feb 25	₹11044.96	-1.88%
Mar 25	₹11257.0	0.0%
Apr 25	₹11257.0	0.0%

Figure 5:

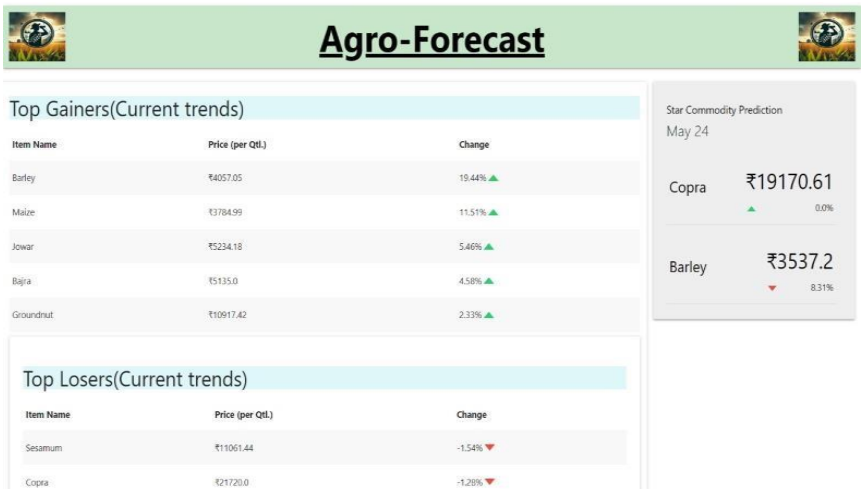


Figure 6:

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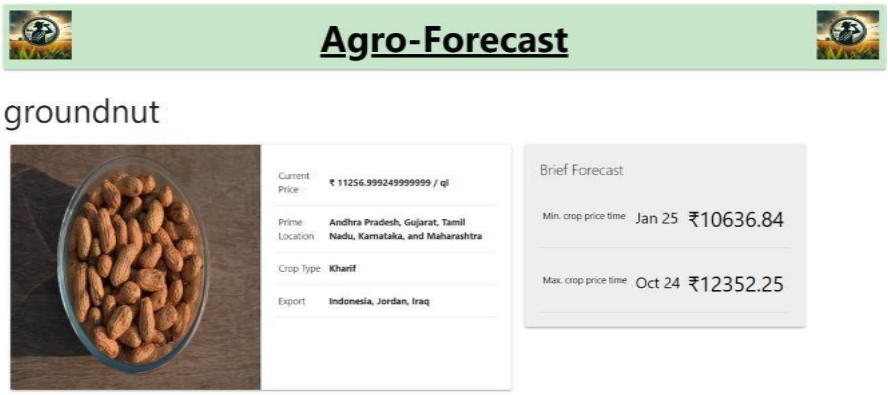

Figure 7:

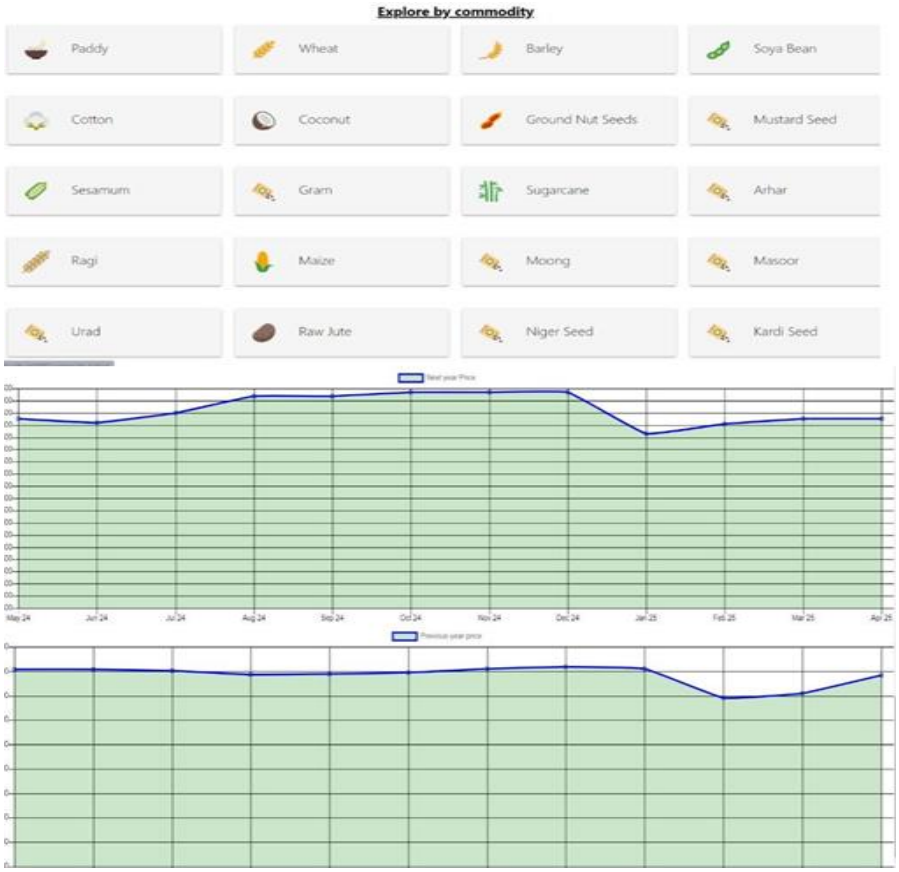

Figure 8:

IX. CONCLUSION

To meet global food demands, integrating modern agricultural technology is crucial. Agronomists need efficient frameworks for forecasting crop production and maximizing yields. Machine learning-based models analyze large datasets to interpret agricultural dynamics. We propose a method to predict corn production using historical data with machine learning techniques. Market rates reflect supply and demand, guiding agronomic timelines for revenue optimization. Factors affecting crop prices include weather, market conditions, location, demand metrics, and nutrient status. Empirical analysis confirms the accuracy of our framework in predicting farm prices, with future plans for automated crop yield and price recommendations using genetic algorithms.

We can predict crop yield along with crop pricing by adding more features in the dataset. More number of crops can be added to offer broad range of predictions.

And the web application can be made more responsive with animations and attractive UI and launched online for wider usage.

Various algorithms can be used for crop price prediction such as decision trees, support vector machines, neural networks, deep learning, etc.

Our model used a supervised machine learning algorithm called Decision tree Regressor.

It is trained on several Kharif and Ragi crops (Paddy, Wheat, Cotton, Barley, etc.) providing better accuracy.

The Model further can be trained with climate-aware farming techniques, provide fertilizer suggestions, and identifying systems of crop monitoring, warning on pest outbreak, disease outbreak based on advanced AI Models.

X. REFERENCE

[1] Ishita Ghutake1,Ritesh Verma1,Rohit Chaudhari1, and Vidhate Amarsinh1," An Intelligent Crop Price PredictionUsing Suitable Machine Learning Algorithm" ITM Web of Conferences 40, 03040 (2021)

[2] Pandit Samuel, B.Sahithi, T.Saheli, D.Ramanika, N.Anil Kumar "Crop Price Prediction System using Machine learning Algorithms." Quest Journals Journal of Software Engineering And Simulation, Vol. 06, No. 01, 2020, Pp. 14-20.

[3] S. Rajeswari, K. Suthendran, " Developing an Agricultural Product Price Prediction Model using HADT Algorithm", International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-9 Issue-1S4, December 2019

[4] Gangasagar, Jovin Dsouza, Bhagyashree B Yargal, Arun Kumar, Anuradha Badage, "Crop Price Prediction Using Machine Learning Algorithms ", International Journal of Innovative Research in Science, Engineering and Technology, Volume 9, Issue 10,October2020.